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COMPLETE SPECIFICATION.

Closed Removable Needle Bearing.

I, GEORG EISGRUBER, of 33, Rennweg, Nuremberg, Germany, of German Nationality, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a closed removable needle bearing especially for use as a transmission bearing and as a bearing for cylinders and pairs of cylinders on rolling mills by the construction of which it is possible to employ needle bearings which are very sensitive to bending.

The closed needle bearing according to the invention is characterized in that on the rigid supporting sleeves on one or on both sides split clamping cones are arranged and at the points of abutment of these clamping sleeves annular grooves are provided in the interior of the supporting hub. Thus the supporting hub is subdivided into a rigid supporting part free from distortion and one or two slightly resilient part or parts. By this subdivision it is possible to employ needles which bend very easily and which, as is known can only be used where distortions of the bearing do not take place.

As compared with the known ball or roller bearings, the advantage is derived by this type of bearing, that it can also be used when it is strongly stressed as regards shocks. Further, the bearing is of very small dimensions and can be substituted for any ring lubricating bearing. Consequently, all the advantages of the needle bearing are utilized to best advantage for transmission bearings and bearings for the cylinders in rolling mills.

When a split clamping cone is arranged only on one side as in the case of bearings which are only accessible from one side as for example bearings on rolling mills and similar machines, it is advisable to arrange an annular flange adjacent the annular groove, so that this annular flange in any case avoids the transmission of any supplementary pressure onto the supporting part of the hub when tightening the clamping cone. At the same time a certain rigidity is imparted to the supporting part, this being particularly important in the case of the shocks which occur in rolling mills and similar machines.

In the case of transmission bearings, these shock pressures do not occur, so that in this instance the radial fixing of the middle supporting part by means of clamping cones arranged on both sides is preferable.

The freedom from stressing and distortion is ensured by the annular groove and the fact that the supporting sleeve and the clamping cones are of different thicknesses at their point of abutment.

The individual parts of the bearing, such as clamping nuts, pressure and supporting ring and so forth, inter-engage labyrinth-like, so that the bearing can be removed closed and dust-tight at any time as is often necessary, it being particularly noted that the clamping elements can be tightened and loosened from the outer side.

Two embodiments of the invention are illustrated by way of example in the accompanying drawing in which:—

Fig. 1 shows an axial section of a transmission bearing.

Fig. 2 is an axial section through a bearing accessible only from one end for rolling mills or similar machines.

The needle bearing according to the invention consists substantially of a supporting element *a*, on one or both sides of which split clamping cones *b* are arranged according to the purpose of use. In the case of transmission bearings (Fig. 1), in which not very high pressures occur, the two-sided arrangement of the clamping cones *b* is preferably chosen, which cones radially fix the bearing in a perfect manner. In order to prevent the bending moments, occurring during the clamping, being transmitted to the supporting element *a*, the supporting hub has at the points adjacent the clamping cones two annular grooves *c* and the clamping cones are of different thickness to the supporting element. Thus, the supporting element *a* is therefore held free from stresses and distortion. The supporting element *a* itself may be hardened and

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serve as race for the needles *d*.

The outer supporting ring *e* is fixed by means of pressure rings *f* and clamping nuts *g*, these nuts serving at the same time as guide rings for the bearing.

The clamping nuts *g* are extended beyond the clamping cones *b* in such a manner that the flaps *j* engage over the clamping cones *b* so that the lubricant will not escape through the slits of the clamping cones *b*.

Therefore, contrary to all known constructions, special guide bearings are omitted, which fact represents a considerable simplification of the bearing according to the invention from a manufacturing point of view. The pressure ring and clamping nuts are moreover provided with labyrinth passages *h* of different depths, so that at the same time an absolutely oil and dust-proof packing is ensured when fitting the bearing. The bearing element can be dispatched thus closed, which is extremely important in the case of transmission bearings owing to the danger of soiling.

As above mentioned, it is also possible to fix the bearing on both sides. The bearing, for example where the bearings are only accessible from one end as in rolling mills and other machines, must be provided with only one clamping cone *b*, and an annular flange *k* is arranged opposite the annular groove *c*, which flange forms a unit with the supporting element *a* and the clamping cone *b*. This annular flange serves for imparting greater strength to the supporting hub and to enable the tightening of the clamping ring *l* by means of screws *m*. It is evident that for the clamping ring *l* a clamping nut may be substituted. Between the supporting ring *e* and the supporting element *a* an inner race ring o_1 is fixed axially against a shoulder of the cylindrical supporting element *a* by the small pressure ring *f* and an outer ring o_2 is fixed axially by a large pressure ring *p*. The screws *m* have each a collar *q* which automatically removes the clamping ring *l* when the screws *m* are unscrewed. A catch disc *r* is arranged on the supporting ring *e* so that the entire bearing can be removed from the machine frame after the clamping ring *l* has been removed. Further, the annular flange, the supporting and pressure rings in this instance also inter-engage in labyrinth fashion so that an absolutely closed oil and dust-proof bearing element is produced.

The essential advantages of the invention are based on the facts that the supporting element *a* of the hub is held absolutely free from stressing and distortion by means of the annular grooves and so forth, and that the clamping and supporting elements are at the same time packing elements so that the very advantageous needle bearing can be employed for new purposes in the construction of transmissions, rolling mills and so forth.

Further, by the employment of needles, the dimensions of the bearings can be made small, this being particularly important in the building of rolling mills and where in the case of pairs of bearings compactness is necessary, as only limited space is available for the bearings. Moreover, owing to the construction, a simplification of the manufacture is ensured and such needle bearings may be regarded as universal bearings, especially because any known bearing can be replaced by a needle bearing according to the invention. A particular advantage consists in the fact that the bearing can be fitted and removed in closed condition and can therefore be also dispatched in closed condition. Consequently, the delicate needles are no longer liable to become soiled as heretofore.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1.—A closed, removable needle bearing for use as a transmission bearing or as a bearing accessible only from one end such as employed in rolling mills and similar machines, characterized in that on the rigid supporting sleeve (*a*) on the one side or on both sides slit clamping cones (*b*) are arranged and on the points of junction of these clamping cones annular grooves (*c*) are provided in the supporting hub, whereby the clamping supporting hub is subdivided into one or two resilient clamping parts (*b*) and one rigid supporting part (*a*) free from distortion.

2.—A needle bearing as claimed in claim 1, characterized in that in the case of a bearing only accessible from one end only one resilient clamping part (*b*) is provided and the supporting sleeve (*a*) has an annular flange (*k*) on its end adjacent the clamping part (*b*) which flange takes up any bending moments occurring during the tightening of the clamping cone.

3.—A needle bearing as claimed in claims 1 and 2, characterized in that an outer supporting ring (*e*) is secured on the hub by a pressure ring (*f*) and clamping nuts (*g*) the adjacent faces of which elements and, in the case of a bearing only accessible from one end, also the surface of the flange interengage in labyrinth fashion forming an absolutely dust and oil-proof closure.

4.—A needle bearing as claimed in claims 1 and 2, characterized in that the supporting sleeve (*a*) free from tension serves as the inner race for the needles.

5.—A needle bearing as claimed in claim 3, characterised in that the pressure rings (*f*) are constructed as guide rings for the bearing.

6.—A needle bearing as claimed in claims 1 and 3, characterised in that, if the clamping cones (*b*) are arranged on both sides, the cone nuts (*g*) project beyond the clamping cones and have flaps (*j*) adapted to prevent the lubricant from flowing through the slits of the clamping cones.

7.—A needle bearing as claimed in claims 1, 3 and 5, characterised in that the supporting hub (*a*) forms with the clamping nuts (*g*), pressure ring (*f*) the needles and the outer supporting ring (*e*) a closed, removable whole.

Dated this 26th day of August, 1932.

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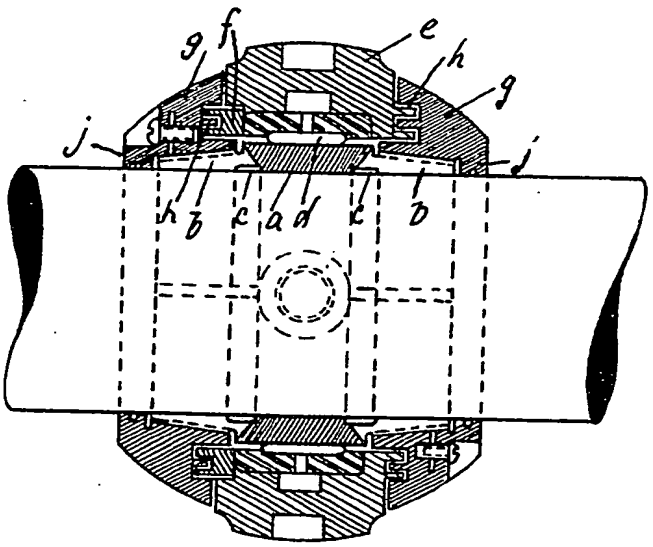

Fig. 1.

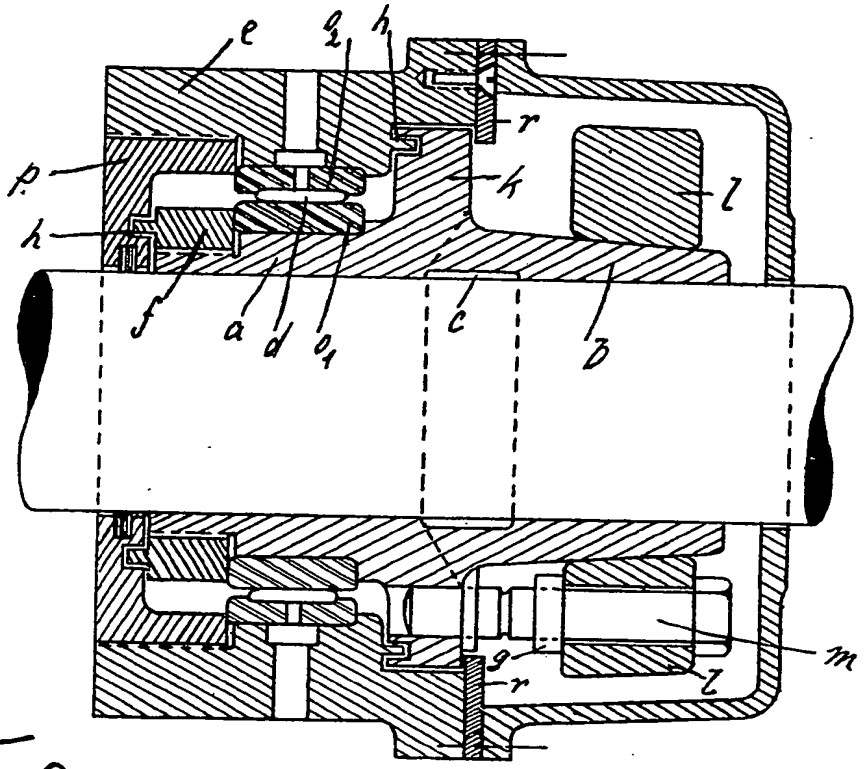

Fig. 2.

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